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Synthesis of fe-pillared interlayered clays and its application for the catalytic cracking of alkanes

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Abstract

© SGEM2018. Metal oxide pillared interlayered clays (PILCs) possesses several attractive properties, such as constant high porosity with presence of both micropores and mesopores, thermal stability (up to 450°C), surface acidity and catalytic active components-metal oxide pillars. Thanks to these specific characteristics of PILCs they can be used either as catalyst or as catalyst support in a wide range of catalytic applications, including catalytic cracking processes. In this work Fe-pillared interlayered clays (Fe-PILCs) were obtained by intercalating trinuclear acetate hydroxy-iron (III) chloride between the layers of Na-exchanged montmorillonite with following calcination and characterization by different analytical techniques. Trinuclear acetate hydroxy-iron (III) chloride was chosen as pillaring agent because its cations are more stable in solution than traditionally used oligo(poly)hydroxy iron cations. X-ray diffraction data showed the increase of basal spacing of the material after calcination (up to 450ºC) indicating formation of thermally stable pillars between the clay sheets. N2 BET specific surface area was 320 m2/g, that is significantly higher compared tovalues (about 200 m2/g) for the traditional PILCs synthesized by alkaline hydrolysis route. Mössbauer spectroscopy displayed presence of superparamagnetic forms of iron and magnetite-like oxides, connected with aluminosilicate matrix. Obtained material was studied as catalyst for the cracking of higher hydrocarbons with composition of C11-C22.

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Keywords

Catalytic cracking, Higher hydrocarbons, Mössbauer spectroscopy, N -adsoption 2, Pillared clays, X-ray diffraction

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